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deaths were reported during the next week, but on February 15, 1915, 16 new cases were found, and during February a total of 101 cases, with 11 deaths, was reported. In March there were 63 cases and 14 deaths, in April 38 cases and 7 deaths. No cases or deaths were reported during May and June. A total of 208 cases, with 32 deaths, occurred during the outbreak, giving a fatality rate of 15.38 per 100 cases.

PUBLIC HEALTH ADMINISTRATION IN CHICAGO, ILL.

A STUDY OF THE ORGANIZATION AND ADMINISTRATION OF THE CITY HEALTH DEPARTMENT.

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[This is the fourth installment of this report. Previous installments will be found in the Public Health Reports Aug. 20, 1915, p. 2442; Aug. 27, 1915, p. 2536; Sept. 10, 1915, p. 2695.]

BUREAU OF VITAL STATISTICS.

The essential duties of the bureau imposed by statutes and ordinances are (1) registration of births, (2) registration of deaths and control of the disposal of the dead, and (3) statistical tabulation of birth and death records.

The work of the bureau has been handicapped by limited appropriations and it has been impossible, on account of lack of funds, to employ a sufficient personnel to index the old records and compile the data contained therein. During the period from 1909 to 1911 the appropriation for the bureau was reduced one-half. This resulted in curtailment of its work, and the effect has not yet been entirely overcome.

Summary of ordinance provisions.—Before taking up the consideration of the different functions of the bureau, a brief summary of the ordinance provisions is advisable in order to show the authority for its various activities.

Existing ordinances provide as follows:

It is the duty of the commissioner of health to provide necessary books for keeping a record of all transactions of the department, for the registration of births and deaths occurring in the city, and such other records as are necessary for the efficient working of the department. He must keep on hand the necessary blanks and furnish them to physicians and midwives on application.

It is the duty of every physician or midwife who attends the birth of a child to report the same, with name and date of birth, to the department within 30 days.

It is the duty of every physician or midwife to make a written report to the health department within 24 hours of the death of any of his or her patients; in event the death is a coroner's case, the report is made by that official.

Any person desiring to act as an undertaker, prepare dead bodies for burial or cremation, or manage funerals, etc., must be licensed, and it is unlawful for any person to engage in such business prior to obtaining a license.

Any person desiring a license to act as an undertaker must apply in writing to the commissioner of health, giving his name and address, showing that he is a licensed embalmer, and giving the location of the place where he intends to conduct the business of undertaking. The applicant must furnish evidence that he is familiar with the laws and ordinances of the city and the rules and regulations of the health department governing the removal, preparation, and burial or cremation of the dead; also that he has practical knowledge of approved and sanitary methods of caring for the dead, including embalming of dead bodies, and furnish evidence of his responsibility, moral character, and fitness to carry on the business of an undertaker.

Undertaking rooms must be capable of being completely shut off from other parts of a store or other establishment in which located, must have free outside ventilation and light, a floor of nonabsorbent material, and be connected to the sewer by an approved sanitary drain.

Burial permits must be secured from the commissioner of health or his authorized representative, and it is unlawful for any person to move any dead body from a hospital or from place to place in the city, or to cremate or deposit any human body in a vault within the city, or to inter or disinter, or in any manner dispose of any dead human body or parts thereof without first obtaining a permit so to do.

No permit for the burial of any dead human body will be issued to anyone except a licensed undertaker.

No superintendents of cemeteries or other places for the disposition of dead bodies may assent to interment, disinterment, cremation, or other disposition of a body until a permit is issued. It is the duty of a superintendent of a cemetery, etc., who receives a permit to fill out the coupon attached thereto, sign, date, and return the same to the department of health within 48 hours after receipt.

The bodies of persons who have died of smallpox or plague are buried by the health department in accordance with rules prescribed by the commissioner of health.

Bodies of persons who have died of typhus fever, epidemic cerebrospinal meningitis, scarlet fever, diphtheria, measles, anthrax, infantile paralysis, or leprosy are prepared for burial by having all orifices closed with plugs of cotton saturated with an efficient disinfecting solution and the entire body then wrapped in a sheet saturated with a disinfecting fluid. These precautions must be carried out before placing the body in the coffin.

Every casket or coffin used in the burial of a person who has died of a contagious disease must have a bottom that is water-tight and a well-fitting cover, and must meet with the approval of the health officials.

No person whose attendance is not necessary for the conduct of the funeral of any person who has died of any of the diseases hereinbefore mentioned may enter the premises where the death occurred; however, this is not to be construed as preventing the attendance at such funeral of any adult relative of the deceased person or adult member of the family who has been in attendance upon such deceased during his last sickness, and who has been exposed prior to such funeral to the disease from which such person died. Furthermore, any other persons may accompany or follow the remains of the deceased to the grave, provided they do not enter the premises or occupy the same vehicle as the persons who have entered the premises.

No person may take any article into or remove any article from any room in which a person has died of a contagious disease until such articles have been properly disinfected by the health department.

No person may move or convey any dead human body in any public vehicle, except that of a body of a child under 8 years of age who died of a noncontagious disease and is properly encoffined.

Neither the State law nor the city ordinances are satisfactory and a bill is now pending before the legislature. This bill is in the main

the same as the model bill recommended by the Bureau of the Census, with some modifications to meet special local conditions. Under the provisions of this bill all certificates of births and deaths occurring in Chicago would be sent to the health department, where two copies would be made, one for the county clerk and the other for the files of the department, the original being forwarded to the secretary of the State board of health. Several efforts have been made to secure the passage of such a bill, but sufficient opposition has been encountered to defeat it. The necessity for this law can not be too forcibly emphasized.

In studying the work of the bureau it is advisable to consider it under the different functional divisions.

Registration of Births.

The bureau had a satisfactory organization for registering births from 1898 to 1909. In the latter year this work was discontinued on account of insufficient funds and, furthermore, as a protest against the trend of legislation which it was alleged weakened the law. The protest has not been effective, as the proposed legislation has not yet been accomplished. If the model bill becomes a law, the registration of births will be resumed by the department.

In the interim from 1909 to 1911 there was no registration of births, but in the latter year the county clerk assumed this work and there has been a progressive increase in the number of births registered, so that now approximately 65 per cent are recorded. In 1914 the total registration was 54,000, about 5 per cent of which were from the county outside of Chicago. A law making registration of births compulsory is desirable.

Registration of Deaths and the Control of the Disposal of the Dead.

DEATH CERTIFICATES.

The report of deaths is compulsory and the presentation of proper death certificates is necessary to secure a burial permit. All certificates must be furnished in duplicate; one copy is retained in the bureau and the other is sent to the secretary of the State board of health, who has certain data abstracted and forwards it to the county clerk. The data called for on the certificate are filled in by the following persons over the signature of the informant: Deaths in hospitals, the superintendent or other hospital authority; coroners' cases, the coroner; all others, the undertaker. The certificate is also signed by the respective persons mentioned above, and then the data of primary and contributory cause of death must be included by the physician who attended the case and the certificate signed by him. If no doctor was in attendance, the coroner fills out the required data as to the cause of death and signs the certificate.

Different colored blanks are used in reporting the deaths under the three specific headings. A different form of certificate is used for reporting stillbirths.

Each certificate is dated with the day and hour when received, and after issue of the burial permit is handled according to the following procedure:

Certificates are numbered serially for the year, commencing with number one on January 1; they are then reviewed by a medical clerk, who marks the statistical classification number of the disease on the certificate, and adds that of the sanitary district and the ward number, if that has been omitted by the undertaker. When the cause of death given is not specific and there is doubt which disease was the principal cause, the physician giving the certificate is called by telephone and requested to supply more accurate data.

All certificates reporting a contagious disease as cause of death are assembled and a transcript giving name, age, address of decedent, and disease is prepared of each in triplicate. The original and duplicate forms are sent to the bureau of medical inspection and are required for the purpose of checking against their reports of contagious diseases in order to determine whether the case had been reported.

The next step in the office procedure is the arranging of the certificates for each day in packs of originals and duplicates. The former are placed aside and at the end of the month are packed and sent to the secretary of the State board of health. A synopsis is now made in triplicate of each day's certificates, the number of certificate, name, age, address, and date of death of the decedent being given. These sheets are arranged in packs, and at the end of the month one is sent to the election commission for their information, a second is kept for the use of the public and the press, and the third is filed. A clerk takes off all the pertinent data on a punch card and then a card index, giving the number of the certificate, name, and date of death, is prepared and filed alphabetically by name.

BURIAL PERMITS.

Burial permits are issued upon presentation of death certificates properly prepared. The form consists of permit proper with coupon attached, the stub remaining in the book as the office record. They are numbered serially for each year, commencing January 1. Both the permit and coupon are given the undertaker, who turns both over to the person in charge of the cemetery. The cemetery clerk files the permit for his records and returns the coupon to the bureau, where check is made against the certificate in order to determine that the burial was made in the specified cemetery. These coupons are not destroyed, but filed in packs of 100 each.

In coroner cases, where an inquest is still pending and the cause of death has not been actually determined, a provisional certificate is given by the coroner granting permission for burial of the body. Upon completion of the inquest the coroner furnishes the regularly prescribed death certificate and then a coupon is prepared giving number and pertinent data. This is attached to that corresponding to the burial permit issued. A book record is kept of all such cases, and when the proper death certificate has been received the corresponding case is checked off. If the certificate is not received in due time, the coroner is addressed for the purpose of securing it.

An investigation was made by the efficiency division to determine to what degree reports were being made of deaths where the bodies were buried in public cemeteries. Seven outlying cemeteries were visited and 226 names of persons whose bodies had been recently buried were compared with the health department records. These tallied in each instance; therefore, it is fair to assume that the bureau is securing a good record of cemetery burials, as any case of fraud or negligence in reporting would probably occur in outlying cemeteries.

Burials out of the city.—A different form of burial permit is issued when a body is removed for burial in some place out of the city. The permit proper gives name, age of decedent, and the disease causing death. This is taken by the person accompanying the remains to the receiving authority. A certificate is filled out by the undertaker and affixed to the box containing the coffin. Duplicates are sent to the secretary of the State board of health. A stub containing all pertinent data is prepared for the purpose of keeping the numbers in order.

Burials in the city of persons dying in other localities.—Burial permits and certificates accompanying the body are taken up and placed in special file and regular burial permit issued. All data are copied on a death-certificate blank with a different color of paper for the purpose of a record. A card index is also made in such cases.

Disinterments and reinterments.—When a body has been in a vault less than 30 days the procedure for interment is the same as already given except that the undertaker must file an application requesting authority for removal and burial of body.

When the period of time has been longer than 30 days and in all cases in which the body has been buried, the procedure is different. Application is made by the undertaker, and if reinterment is to be made in a different cemetery in the city, burial permits are issued in duplicate—one is retained by the authorities of the cemetery from which the body is disinterred and the other by the clerk of the cemetery in which reinterment is made. All applications are retained in the bureau and the records are corrected to show the actual cemetery in which the body is buried.

When the body is to be removed from the city for burial in another locality it is necessary to secure the permission of the department, the secretary of the State board of health, and the receiving authority before the body can be disinterred and transported. A special blank is prepared and sent to the different officials for their consent and signature. When this is returned, burial permit is issued in the same form and manner as prescribed for burial out of city.

LICENSING OF UNDERTAKERS.

The bureau has control of the examination and licensing of undertakers. A person to be eligible for such an examination must hold a State embalmer's certificate. An application is filed, and if the examination is satisfactorily passed, recommendation is made for license, which is issued by the mayor. The same requirements must be met by undertakers' assistants, except that in this class a certificate is issued by the commissioner of health. Examinations are given by the bureau chief.

INSPECTION OF UNDERTAKING ESTABLISHMENTS.

After the passage of the city ordinance requiring that undertaking rooms should meet certain sanitary conditions, licenses have not been issued to undertakers until the rooms in the proposed establishments have been inspected and approved by the health department. This inspection work constitutes one of the field activities of the bureau and a careful examination is made of undertaking rooms and a card containing all pertinent data is made for each establishment. If the condition of rooms is found unsatisfactory the proper corrections must be made so as to comply with ordinance requirements.

CONTAGIOUS-DISEASE FUNERALS.

Another field activity of the bureau is the control of contagious-disease funerals. An inspector is present at the house in such instances to see that the rules of the department governing are observed.

Disinfection.—Disinfection of rooms in which deaths have occurred from contagious diseases is performed by the quarantine officers of the bureau. The object is to have this work promptly executed as soon as the body is removed from the house and while the family are at the cemetery. The technique of such disinfections is the same as prescribed under the bureau of medical inspection.

MISCELLANEOUS INSPECTION.

Conditions in connection with mortuary control occasionally arise which require special inspection and action by the department.

The number of employees for field work, which embraces disinfection, control of contagious-disease funerals, inspection of undertaking

establishments, and miscellaneous inspection, is four, although at present only three are so employed.

The field employees report at the bureau each morning for assignments, and "call up" the office by telephone during the day for any additional assignments.

Daily reports are made by the inspectors employed in field work, and these are received and checked in the office.

CERTIFIED COPIES.

Certified copies of certificates of death are prepared by the bureau upon request, and for this service a charge of 50 cents is made for each certificate. The money collected for certified copies is delivered to the city treasurer each day with proper deposit slip, and a cash abstract of the transactions is sent to the auditor.

MORTALITY STATISTICS.

Prior to 1912 all the mortality data were tabulated by hand, but at that time the advantages of having tabulations done by the Hollerith method were taken into consideration and a contract was made for having this work done by a private company. The work done under contract is said to have been found not altogether satisfactory, and since January, 1915, the bureau has tabulated its mortality data by utilizing a central statistical bureau formed for the use of all city departments.

All pertinent data from the death certificates are punched on the card, and then taken off on the tabulating machines in the central bureau. Cards are first assorted according to cause of death, and data relative to each cause are tabulated, including age, sex, nationality, and social status of the decedent; the nativity of parents (native, foreign, or mixed of both parents and the nativity of mother); wards and sanitary districts; and also whether the decedent was a resident of the city.

Practically all general data are tabulated by the Hollerith method, but tabulations for the monthly report or of contagious diseases by wards are made by hand, a method said to be more satisfactory and economical.

Chief statistician.—A senior statistician prepares special statements and an analysis of mortality data for graphic presentation by charts, etc.

Files.—An index card is made of each death certificate, giving name and address of the decedent and an office serial number which indicates the year. As already stated, the certificates of some years have not been indexed. This is said to be on account of an insufficient number of clerks.

Death certificates are bound in volumes of 500 certificates each and are filed in the vault. This work is up to date. Certificates of stillbirths are kept in a separate file.

The books containing tabulated data, both the straight runs and cross-tabulations, are indexed according to period covered and carefully preserved in the vault.

GARBAGE AND WASTE.

Although the collection of refuse is not vested in the health department, but is performed by the bureau of streets, the reduction and disposal of garbage have been placed under the direction of the commissioner of health by council order passed July 30, 1913. But since the collection of refuse, especially of garbage, is associated with general sanitary work, it is deemed pertinent to consider both collection and disposition in this article.

Prior to 1905 there was no systematic method of refuse disposal, and garbage and ashes were dumped on vacant ground in the outlying sections of the city. A contract was made that year with the Chicago Reduction Co. for the disposal of the garbage at their plant, which was located in the stockyard section. The company was a private corporation and was paid \$47,500 a year by the city for such service, the city collecting and delivering the garbage to the plant. A second contract was made with this company, which expired in September, 1913, when, after some months of negotiations, their plant was bought by the city, and the work of garbage reduction and disposal was taken over and placed under the health department.

Collection of Garbage.

The amount of garbage collected per capita by the city is smaller than in most large cities; whereas the average in other cities is 150 to 160 pounds per capita per annum, the average in Chicago is only 104 pounds per capita per annum. Taking this as a basis there are approximately 124,800 tons of garbage handled by the bureau of streets during the year. The following factors have a bearing on the smaller amount of garbage collected per capita in comparison with other cities: (a) Larger foreign population; (b) collection of garbage from hotels, restaurants, cafés, boarding houses, and apartment houses by private scavengers at the expense of the owners of the different establishments; (c) large vacant areas which invite disposal of garbage by householders on the premises; and (d) diversion and incomplete collection of garbage in the outlying districts.

A regular collection, with prompt removal and rapid final disposition of household waste, is one of the most important functions devolving upon a municipal cleaning department. The following are

essential for satisfactory service: Ample funds, proper organization and equipment, sanitary and economical methods of work, and cooperation of the public.

Method.—As already stated, the owner or agent of a building is required by ordinance to provide a requisite number of metal garbage cans with tightly fitting covers, and the householders or tenants are required to separate garbage from ashes and rubbish. Experience shows that some educational work and better cooperation of the householder in this particular are desirable.

For facilitating garbage collection the city is divided into 35 wards, grouped in four sections, in relation to the two loading stations, the reduction plant, and a dump in the southern part of the city. The average haul is 3.2 miles.

The two loading stations are located on the Chicago River in the densely populated sections of the city and about two-thirds of the amount of garbage are handled at these stations. The filled garbage boxes are removed from the wagons to a barge by means of a crane, and a clean empty box is placed on the wagon; this loading is done during the day and in the late afternoon the barge is towed to the reduction plant, the boxes are unloaded, and their contents are emptied into the storage bin at the plant. The boxes are washed and replaced on the barge, which is returned to the loading station during the night, to be in place to receive the garbage the following day. The garbage is treated during the night, and on the morning of the next day when the amount is large in the summer season.

The garbage in the section of the city near the reduction plant is hauled direct to the plant, and the wagons begin to arrive at that point about 1 o'clock p. m. and continue coming during the afternoon. This garbage is treated in the afternoon.

In the extreme southern part of the city, embracing wards 8, 9, and the lower portion of 32, the amount of garbage is so small and the haul so long that the cost incident to removal to the reduction plant is not justified. In this section the garbage and waste are collected together and dumped on the low area around Lake Calumet; an incinerator of 100 tons capacity in 24 hours is now being erected, however, and in a few months it will be in operation to dispose of this garbage by incineration.

Two-horse-team wagons are used for collecting; the wagon consists only of a framework on which an iron box of 4 cubic yards capacity is placed. These boxes, or tanks as they are often called, are constructed of heavy sheet iron, braced through the center, have stout trunnions from the middle of each end and have an iron cover, made of four sections, hinged to a longitudinal bar extending from end to end of the box. At the loading stations they are easily removed by cranes, a bar the length of the box with chain attachment

at each end being hooked to trunnions on the box for facility in handling.

At the reduction plant unloading of boxes from wagons or scows is effected in the same manner, and as they are lowered into the storage bin a chain that has been fixed beneath the box and fastened in a ring on one side causes the box to be turned bottom upward and the contents dumped.

A satisfactory equipment for collection is one so constructed as to enable transportation without leakage or scattering of material on the street, to permit of cleaning, and to prevent the escape of odors. Taking the above as a standard to be met the tanks are well adapted for the service.

The drivers report at a central point in the ward and are assigned a specific route, the object being for them to become familiar with their district and thereby be capable of rendering more efficient service. The collection is carried out under the direction of the ward superintendent. The loading is done by the driver, but in some wards where the amount of garbage is large, a laborer is provided to assist in this work.

The city owns the wagons and boxes and hires the teams and drivers. The average number of wagons in use for garbage collection is 175 during the winter and 225 in the summer. There is much seasonal variation in the amount of garbage, and July, August, September, and October are the heavy months. The amount during these months is about double that in the winter.

The total cost of garbage collection, disposal not included, is \$452,000 a year.

Garbage Disposal.

The proper disposal of the garbage of a large city is a question that is now receiving much study, and when the contract of the private reduction company that had been treating the garbage of Chicago expired and the municipality contemplated taking over the work, the city engaged Messrs. Osborn and Featherstone to make a critical study of the collection and disposal of garbage in Chicago in order that a satisfactory system might be evolved.

GENERAL OBSERVATIONS.

The disposal of garbage in cities of considerable size is either by incineration or reduction, as the method of dumping or filling is unsatisfactory except in a few instances and as a temporary expedient. Reduction is the process used in the larger cities of the United States, and has the advantage over incineration, when large quantities of garbage require disposal, in being more economical, because it saves the by-products of grease and tankage, which have considerable value.

One of two methods is used in reduction plants—cooking or drying of the garbage. In the former the garbage is digested by boiling and the liquids and grease are removed by pressure; in the latter the garbage is dried by direct applications of heat and the grease extracted from the dried product by the use of naphtha. The small amount of garbage collected by private scavengers from hotels and restaurants in Chicago is reduced by cooking; that of the city generally is treated by the drying process.

If the following essential features concerning design and installation of reduction plants, viz, sanitation, freedom from nuisance, and selection of proper apparatus for operation, are borne in mind, most of the complaints against reduction plants will be obviated. The details of the plant should be such as to enable the place to be kept clean at all times and permit hosing and washing of all parts of the building and premises. Garbage dust and dirt should not be allowed to accumulate to decompose and breed flies. Mechanical means for handling garbage should be utilized as much as possible.

Objections to reduction plants are usually on account of odors, which may arise from the raw garbage and gases given off by the dryers and those arising in the plant due to nature of material and method of handling. Criticism of such plants generally results from the manner of construction and method of operation. The reduction plants in a majority of the cities are owned and operated by a private corporation, and as the contractors have an agreement to dispose of the garbage only for a limited time, such plants are cheaply constructed, have inferior equipment, and little or no attention is paid to general sanitary requirements.

The statement made above was especially applicable to the plant of the Chicago Reduction Company that was treating the garbage of Chicago under contract. The plant was run in a most insanitary manner, and the nuisance resulting was a cause for frequent complaint by the citizens living in adjacent districts. Garbage was not properly housed, but piled and scattered on the premises. The offensive odors resulting from this and those arising from the operation of the plant were so intense that they could be detected for a considerable distance.

EMERGENCY DISPOSAL OF GARBAGE.

Owing to delay in the negotiations of the city for the purchase of the reduction plant of the private corporation it became necessary on October 1, 1913, to provide some temporary means for disposal of the city garbage. This emergency was met by selecting an abandoned brick yard, where a large clay hole excavation existed, and the garbage was disposed of by filling. The necessary plant, consisting of cranes, tanks for thawing the garbage, tanks for treating the garbage with acid solution, track, etc., was erected and the handling of refuse begun.

Briefly, the method of disposal was as follows: After thawing, if garbage was frozen, by immersion of the garbage boxes in tanks of hot water, the contents of the boxes were dumped into vats, which were filled within 2 feet of the top. The garbage was then covered with a 1 per cent acid solution, equal parts of crude hydrochloric and sulphuric acid being used, and was allowed to remain under this treatment for 12 hours. The liquid was then drained off through openings in the bottom of the vats and when the garbage had become fairly dry it was picked up by an orange-peel bucket, operated by a crane, and loaded on cars for removal to the hole for dumping. The garbage was distributed over the bottom of the excavation in a layer 1 foot thick, then a layer of ashes $1\frac{1}{2}$ or 2 feet thick was spread over the garbage. This process was continued, layer by layer, in the same manner and proportion of garbage and ashes.

It was necessary to handle about 60,000 tons of garbage in this manner and the method proved entirely satisfactory as an emergency measure. The action of the acid is simply to retard decomposition of the garbage until the ashes can become thoroughly mixed with it. In a few months the garbage has become thoroughly disintegrated, and the fill is dry and inoffensive.

The reduction plant, which in the meantime had been bought by the city for \$275,000, was sufficiently repaired so that it was available for use about the middle of June, 1914, and the disposal of garbage by reduction was then commenced.

CHICAGO REDUCTION PLANT.

As already stated, the disposal of garbage is under the health department and the operation of the reduction plant is under the direction of the commissioner of health. The reduction of garbage is by drying.

A study was made of the plant and its operation, and a brief description of the process of handling garbage is considered in place in this report.

The garbage is unloaded into a concrete storage bin having a capacity of 1,000 tons; this is arranged with two rows of gate valves in the bottom regulating the discharge of garbage upon two conveyors. On the front of this bin there is a hot-water tank for immersion of the boxes to thaw the garbage when frozen in winter. The conveyors carry the garbage to crushers. Generally two are operated, although there is a third for emergency use. From the crushers the garbage is carried by a set of button conveyors to a platform above the fire-box end of the primary dryers. There is a chute leading from the platform to each of the six dryers, and the garbage is shoveled into these chutes and passes into the dryer. Heat is applied by an oil burner with forced draft by means of compressed air, and a temperature of 500° F. is generated. The dryers

revolve slowly, and being set with a slight declivity and equipped with flanges on the inner surface, the garbage gradually passes to the other end of the dryer and falls into a trough, through which a conveyor takes it to an elevator that empties it into secondary dryers, two in number. After passing through the second dryer the dried garbage is taken by conveyor to an elevator which discharges it into cars or a storage bin. The garbage from start to finish is handled mechanically.

A plenum chamber is connected with each of the dryers; from it the gases and vapors produced by the drying process are exhausted by a fan and passed into the condenser. The condenser, in reality a scrubber, is equipped with numerous sprays of water through which the gases pass. The soluble gases are knocked down and the bulk of the odors eliminated, and the insoluble ones and vapor are discharged from the condenser through a tall chimney into the open air. The time necessary for the complete process of drying the garbage is about one hour.

Green garbage contains 75 to 80 per cent water; after passing through the primary dryers the amount of water has been reduced to 30 per cent; and when the process is complete it contains 10 per cent of moisture. The dried product contains 85 per cent dried garbage, 10 per cent water, and 5 per cent waste.

Owing to the fact that there were no funds available in 1914 for the reconstruction of the extraction plant, the dried garbage is now sold to a private company for \$5.77 per ton. When it is taken into consideration that garbage yields 3.25 per cent of grease and 14 per cent of tannage, and that the former has a commercial value of 4 cents a pound and the latter of three or four dollars a ton, the advisability of the city's handling these by-products by means of its own plant is apparent. The value of the products would cover the cost of reduction and probably yield a slight income. In some municipal plants sufficient profit is derived from the by-products to cover cost of operation, fixed charges, and interest on the capital account.

The plant is operated in three shifts of eight hours each. All the machinery is run by electric motors. The plant throughout and the premises generally are kept scrupulously clean, and there is a remarkable freedom from disagreeable odors. The plant is conducted in a sanitary manner, and there is no cause for complaint by the persons living adjacent. In fact, upon inspection all parts of the buildings and premises were found clean. The sides of the storage bin and machinery, conveyors, crushers, etc., were also in the same good sanitary condition, and during the operation of the plant no garbage was scattered on the floor. If any fell on the platform around the bin, it was immediately swept up, and the same procedure was followed in event any fell from the conveyors to the floor of the building.

Efficiency of operation.—In studying efficiency of operation, especially in its economic phase, the fact that the plant is undergoing repair and construction must be taken into consideration.

The purchase of the plant was made in February, 1914, for \$275,000, about one-half of that amount being for the land on which the plant was located. Extensive repairs to the building and apparatus, including the construction of the storage bin, concrete wharf, and installation of cranes for handling the boxes in unloading were necessary before the operation of the plant could be started. As it was deemed advisable to retain for this work a certain proportion of the skilled employees who had previously worked at the plant, there was considerable labor charge for nearly five months before actual operations commenced on June 15.

A new reinforced-concrete building has been constructed for housing two new dryers that have been installed. These dryers are more modern and dry the garbage by a single process. Their efficiency has proved satisfactory, and it is the intention to gradually replace the old dryers with this new type. A new condenser or washing room for treatment of gases in connection with the new dryers has also been constructed. The new installation was not completed until near the end of 1914.

The following statement of account for 1914 has been taken from the bulletin of the health department:

Expenses for 11 months.

Labor.....	\$75,678.49
Office.....	4,715.38
Coal.....	2,730.58
Fuel oil.....	30,052.96
Power.....	7,218.05
Machinery repairs.....	1,978.56
Factory supplies.....	2,056.26
Building repairs.....	295.52
Office supplies.....	1,319.98
Service and benefits.....	3,624.61
Advertising.....	37.70
Total.....	129,708.09

Revenue during 11 months of operation.

Miscellaneous earnings.....	\$114.56
Dried garbage sales.....	111,855.99
Inventory account.....	1,731.00
Total.....	113,701.55
Leaving a net loss of.....	16,006.54
Against this loss there is to be credited.....	43,541.66
Which is eleven-twelfths of the \$47,500 previously paid by the city each year to the Chicago Reduction Co.	
This gives a net saving of.....	27,535.12

Against this should be charged depreciation and interest on the investment. As the plant was being rebuilt and operated at the same time, and four-fifths of the money which went into the plant went for reinforced-concrete and steel construction, concrete wharf and similar items upon which the depreciation is practically nil, it is impossible to arrive at any basis upon which to calculate depreciation; but in any event, the amount would be very small, referring, as it would, entirely to the upkeep of moving parts, such as gears, elevator buckets, and the like.

The plant, as it stood on December 31, 1914, represented a total investment of \$683,000.

The greater portion of this expenditure, at least 60 per cent of it, was not made until after the 1st of July, much of it not until November and December, when the payments were made to the contractors. As these payments were made from time to time it would be very difficult to make an accurate calculation of the interest, but it is well within the fact to charge interest on half of the investment for 11 months, and on the other half for 6 months. This gives a total interest charge of \$21,770.63.

Deducting this charge for interest from the net saving of \$27,535.12, noted above, gives a final net profit of \$5,764.49.

Future construction.—To increase efficiency of collecting garbage a wagon box of 6 cubic yards capacity has been designed. The trunnions on this box are placed below the center of gravity so that the box will be turned and dumped by its own weight. This will effect a saving of at least two garbage handlers.

In further extension of the plant two additional monorail cranes of an improved design will be installed. One of these cranes is to be equipped with a clamshell which, when in operation, will pick up and distribute the garbage over the gate valves in the bottom of the bin, thereby obviating the necessity for shovelers in the bin.

A further addition to the plant by the installation of two new dryers is contemplated; also the reconstruction of the grease-extraction plant and the rebuilding of the mill house. A machine shop, storeroom, and office building are badly needed.

ASHES AND RUBBISH.

Ashes and rubbish are collected together by the bureau of streets and are disposed of by dumping in clay holes and on low ground in the outlying sections of the city. Much of the paper rubbish is burned in portable burners.

The amount of ashes and rubbish collected in Chicago is 790 pounds per capita per annum, making an annual total of about 948,000 tons. This class of refuse is collected in wagons of 5 cubic yards capacity, and with the exception of one loading station is hauled direct to the dump. Four hundred teams a day in summer and 600 in winter are used in this service.

This waste is hauled from the loading station, located in the area of congested population, in cars operated over an electric street railway line. The amount so handled, however, is small, as only 50 teams haul to the loading station.

The service is supplemented by that of alley cleaning, which consists of sweeping improved alleys and burning the paper in portable incinerators, and in raking rubbish together in unimproved alleys to facilitate picking up by teams.

Portable burners for disposal of paper waste were introduced in 1911, and there are now 143 such incinerators in use. The burner consists of an iron bucket, carried on wheels, which can be pushed down the street or alley and operated by one man. In summer when the amount of paper waste is large, these burners provide an economical method of disposal. The only objection to them is that the smoke occasionally causes complaints from the residents.

In large buildings of six or more flats, the owner or agent is required to remove the ashes and rubbish at his own expense.

The cost of collection and disposal of ashes and rubbish is \$1,085,000 per annum.

An incinerator under the operation of the health department has just been completed. This has a capacity of 40 tons a day and is intended for the purpose of burning the refuse from the vegetable markets and the freight yards, where practically all the vegetables are handled.

DEAD ANIMALS.

For the proper collection and disposal of dead animals the health department has made a contract with a private corporation that pays the city \$25 per annum for the privilege of collecting and rendering such animals, as the by-products of hides and grease extracted from the carcasses more than pay the transportation cost of collection and removal and yield a revenue to the contractor.

The terms of the contract require the company to collect all dead animals reported to it by the health department, police department, and private citizens. A bond must be executed in favor of the city and a sum of \$1,000 deposited with the comptroller by the contractor. In event the contractor fails to remove any dead animal of which he has received notice in 12 hours, and it becomes necessary for the city authorities to order the removal of the animal by other parties, the cost of collection and disposal is a charge against the sum deposited.

Notices of dead animals are received at all stations of the police department, and the contracting company is notified by telephone of the variety of animal and its location. Reports in duplicate are sent to police headquarters, one copy of the report being forwarded to the health department. Reports are also made direct to the health department by telephone or otherwise, the company is notified, and proper entries are made for record.

The contractor is required to submit a daily report of the animals collected and removed, showing the variety of animal, the time when the notice was received, and the time of removal. This report is checked against the reports in the health department, and the efficiency of the work and the promptness with which removal is effected are determined. This service is satisfactory, the present company has been the contractor for several years, and no charges have yet been made against the deposit.

The following table gives the number and variety of dead animals removed during 1914:

Horses.....	7,451
Dogs.....	23,301
Cats.....	4,048
Others (cows, goats, etc.).....	196

The small number of cows, goats, etc., does not represent the total deaths of such animals, as nearly all animals of this class that die are at the stockyards and are handled by another contractor who pays for them.

WATER SUPPLY.

No attempt will be made to discuss the water supply of Chicago, but as the health department conducts a continuous examination, both chemical and bacteriological, of water supplied by the different cribs and pumping stations, a brief mention of a few salient points will not be out of place.

The supply is derived through six intakes or cribs located in the Lake at varying distances from shore, viz.: Lakeview, 2 miles; Harrison, $2\frac{1}{2}$ miles; Chicago Avenue, $1\frac{1}{4}$ miles; Fourteenth Street, 4 miles; Hyde Park (Sixty-eighth Street), 2 miles; and E. F. Dunne, 2 miles.

The Lakeview crib supplies the northern section of the city, the Hyde Park and Dunne cribs the southern part, and the other three the large central portion.

The water from only three cribs (Lakeview, Hyde Park, and Dunne) is treated with hypochlorite. This treatment was commenced at the Dunne crib on March 15, 1912; at the Hyde Park, July 16, 1912; and the Lakeview, August 15, 1913. The service is intermittent, being discontinued during the cold weather, generally from December 12 to March 15, because the solution freezes.

The following tabulated statement of examinations made by the department of health laboratory for 10 months of 1914 gives pertinent data concerning the water supplied by the different cribs:

LAKE VIEW STATION.

[Supplied by Lake View Crib.]

	Total samples.	Colon positive in 1,000.	24-hour agar count above 100.	1914	Total samples.	Colon positive in 1,000.	24-hour agar count above 100.
January.....	12	4	0	July.....	27	7	1
February.....	14	4	1	August.....	26	9	0
March.....	25	2	0	September.....	24	5	0
April.....	25	7	0	October.....	26	0	0
May.....	24	6	0				
June.....	26	5	0		229	49	2

Per cent colon positive in 1,000, 21 per cent; per cent 24-hour agar count above 100, 0.9 per cent.

CENTRAL PARK AVENUE STATION.

[Supplied by C. H. Harrison Crib.]

January.....	4	2	0	July.....	13	4	0
February.....	7	0	0	August.....	13	6	0
March.....	13	0	0	September.....	11	2	0
April.....	13	0	0	October.....	12	2	0
May.....	13	0	0				
June.....	13	3	0		112	19	0

Per cent colon positive in 1,000, 17 per cent.

CHICAGO AVENUE STATION.

[Supplied by Two-Mile Crib.]

January.....	25	8	0	July.....	26	19	0
February.....	16	1	0	August.....	26	20	0
March.....	12	0	0	September.....	24	13	0
April.....	16	0	0	October.....	26	20	0
May.....	25	6	0				
June.....	26	15	0		222	102	0

Per cent colon positive in 1,000, 46 per cent.

FOURTEENTH STREET STATION.

[Supplied by Four Mile Crib.]

January.....	26	2	0	July.....	11	2	0
February.....	16	1	0	August.....	13	3	0
March.....	12	0	0	September.....	13	2	0
April.....	12	1	0	October.....	14	0	0
May.....	12	2	0				
June.....	13	4	0		142	17	0

Per cent colon positive in 1,000, 12 per cent.

SIXTY-EIGHTH STREET STATION.

[Supplied by Sixty-eighth Street Crib.]

January.....	17	5	1	July.....	11	2	0
February.....	9	1	0	August.....	14	4	0
March.....	8	0	0	September.....	9	3	0
April.....	11	1	0	October.....	11	6	0
May.....	13	2	0				
June.....	13	2	0		116	26	1

Per cent colon positive in 1,000, 22 per cent; per cent 24-hour agar count above 100, 0.8 per cent.

ROSELAND STATION.

[Supplied by Edward F. Dunne Crib.]

1914	Total samples.	Colon positive in 1,000.	24-hour agar count above 100.	1914	Total samples.	Colon positive in 1,000.	24-hour agar count above 100.
January.....	13	4	0	July.....	11	2	1
February.....	11	0	0	August.....	13	0	3
March.....	13	0	0	September.....	12	1	2
April.....	13	0	0	October.....	14	1	0
May.....	13	1	0				
June.....	13	2	0		122	11	6

Per cent colon positive in 1,000, 9 per cent; per cent 24-hour agar count above 100, 4 per cent.

A study of the statistical data shows that the water supplied by the Chicago Avenue crib must be regarded as suspicious and it should certainly be treated with hypochlorite if possible. There seems to be some question of the feasibility of installing the necessary tanks for treatment. This crib is too near the shore, is located off the mouth of the Chicago River, and is in the direct line of travel, boats passing very near the crib. All these factors are probably operative in producing the high degree of colon contamination.

The hypochlorite treatment of the water supplied by the Hyde Park and Dunne cribs has been followed by a marked improvement in the typhoid-fever rate in the sections of the city supplied therefrom.

A factor bearing on the Lakeview supply is the discharge of the sewage of Evanston in the Lake several miles above the crib and the possibility of some contamination of the water occurring through currents.

It may be stated that all the water supplied should be treated with hypochlorite with the exception of that of the 4-mile crib.

PARKS AND PLAYGROUNDS.

Chicago has an excellent system of parks, and in addition to 4 large parks there are about 60 small ones scattered throughout the city. Playgrounds have been opened in many, especially in the districts where the working class live, and in many instances they are equipped with gymnasiums, swimming pools, shower baths, and reading rooms.

As indicative of the facilities offered by the playgrounds in Chicago for recreation the following is presented:

Lake Shore Playgrounds, foot of Chicago Avenue. 6.83 acres. Ownership, Lincoln Park Commission. Open 8 a. m. to 10 p. m. Nationality, native. Annual cost of maintenance, \$12,000.

Facilities.—Ball field, one-sixth mile running track, six tennis courts, two gymnastic frames, and other scattered apparatus. A small building with baths, toilets, and playroom, small wading pool.

Employees.—One manager (male), 12 months; 1 instructor (male), 2½ months; 1 instructor (female), 2½ months; 1 instructor (female), Saturdays, 12 months; 1 head

attendant (male), 12 months; 1 laborer (male), 12 months; 1 attendant (male), 4 months; 1 attendant (female), 12 months; 1 watchman, 12 months, 1 policeman, 12 months.

Seward Playgrounds.—Elm and Sedgwick Streets. 1.78 acres. Ownership, Lincoln Park Commission. Open 8 a. m. to 10 p. m. Hall open for dances, etc., until 11.30 p. m. Nationality, Italian, Irish, and Swedish. Approximate cost of equipment, \$275,000. Annual cost of maintenance, \$20,000.

Facilities.—Field house with assembly hall and club rooms, gymnasiums, baths, and toilets for both sexes. Library, outdoor apparatus for both sexes. Small wading pool and sand shelter. Play field surrounded by one-fourth-mile running track.

Employees.—One manager (male), 12 months; 1 instructor (male), 12 months; 1 instructor (female), 12 months; 1 play leader (female), 12 months; 4 attendants (male), 12 months; 2 attendants (female), 12 months; 2 laborers (male), 12 months; 1 fireman (male), 12 months; 1 policeman, 12 months.

Stanton Playgrounds.—Vine and Vedder Streets. 4.78 acres. Ownership, Lincoln Park Commission. Open 8 a. m. to 10 p. m. Nationality, Italian; approximate cost of equipment, \$275,000. Annual cost of maintenance, \$18,000.

Facilities.—Building with baths and toilets for both sexes, library, and playroom. Outdoor swimming pool, ball field. Separate inclosures and apparatus for boys, girls, and small children.

Employees.—One manager (male), 12 months; 1 play leader (female), 12 months; 1 instructor (female), 12 months; 2 attendants (male), 12 months; 1 attendant (male), 12 months; 2 laborers (male), 12 months; 1 fireman (male), 12 months; 2 life guards (male), 3 months; 4 pool attendants (male), 3 months; 3 pool attendants (female), 3 months (Mondays and Thursdays).

Hamlin Playgrounds.—Barry and Hoyne Avenues. 8.64 acres. Ownership, Lincoln Park Commission. Open 8 a. m. to 10 p. m. Nationality, German. Approximate cost of equipment, \$245,000. Annual cost of maintenance, \$25,000.

Facilities.—Field house with assembly hall and stage, clubrooms, library, gymnasiums, and baths for both sexes; swimming pool for summer use, ball field, two tennis courts, boys' outdoor gymnasium; one-seventh mile running track and girls' outdoor gymnasium and children's playground, all completely equipped with apparatus, wading pool, sand bins, etc.

Employees.—One manager (male), 12 months; 1 instructor (male), 12 months; 1 instructor (female), 12 months; 1 play leader (female), 12 months; 1 head attendant (male), 12 months; 4 attendants (male), 12 months; 2 laborers (male), 12 months; 1 fireman (male), 12 months; 1 watchman (male), 12 months; 2 attendants (female), 12 months; 2 life guards (male), 3 months; 4 pool attendants (male), 3 months; 3 pool attendants (female), 3 months (Wednesdays and Fridays); 1 policeman, 12 months.

Wells Park.—Montrose and Western Avenues. 8.17 acres. Ownership, Lincoln Park Commission. Open 8 a. m. to 10 p. m. Nationality, native. Approximate cost of equipment, \$12,500. Annual cost of maintenance, \$15,000.

Facilities.—Field house with assembly hall and stage, toilets for both sexes, winter skating shelter. Shed for storage purposes. Two ball fields, 5-acre lawn for temporary tennis courts, 3 clay courts, inclosure for girls and small children equipped with gymnastic frame, swings, and slides. Boys' field to be equipped later.

Employees.—One manager (male), 12 months; 1 instructor (male), 3 months; 1 instructor (female), 12 months; 1 play leader (female), 3 months; 1 attendant (male), 12 months; 1 attendant (female), 12 months; 1 watchman (male), 12 months; 2 laborers (male), 12 months; 4 laborers (male), 3 months; 1 policeman, 12 months.

Nineteen other playgrounds in connection with the small-parks system provide the following facilities: 7 separate athletic fields, 12

open playfields, 18 skating ponds, 3 field houses with gymnasium, 12 sheltered platforms, 13 sand courts, 1 wading pool, 11 single and 8 double fields, 5 running tracks, 13 basket-ball fields, 4 baseball and 4 ball fields, and lawn-tennis courts.

There are also 13 permanent and 2 temporary buildings.

ACKNOWLEDGMENT.

Acknowledgment is made of the facilities extended by the commissioner of health, assistant commissioner, and the chiefs of the different bureaus, all of whom gave me free access to all records and extended every opportunity desired for the field study of the different activities of the department. Acknowledgment is also made to the efficiency division for preparation of charts of organization and other assistance.

CONCLUSIONS AND RECOMMENDATIONS.

Commissioner's Office.

(1) The health department is well organized for effective work by the creation of bureaus for the different activities.

(2) The administration of the department is free from political interference; all the employees are civil service, except the commissioner, who is appointed by the mayor and confirmed by the city council.

(3) The administration of the department is efficient, and during the past three years an improvement in organization has been effected and the scope of activities extended, with increase not only in amount of work accomplished but also in raising the standard of efficiency.

(4) The membership of the commissioner on other committees and boards constitutes a decided advantage in relation to public-health administration.

(5) Particular stress is laid on educational work in fostering improvements in living conditions and the advancement of the community in matters pertaining to sanitation generally.

(6) The school of sanitary instruction conducted by the department is an important provision, as it furnishes the means of instructing all employees of the department, especially the temporary or probationary ones, in the proper method of performing their work. Through the school, instructions on sanitary subjects are available for others interested in such work.

(7) The organization in the commissioner's office is satisfactory in office routine and distribution of work.

(8) The efficiency of the work in the office of secretary's division would be increased by the appointment of a property clerk, who could exercise more supervision over property returns and make inventories of property, that can not now be carried out with the present office force.

(9) The department, by change of office procedure and by closely following the suits filed, has effected a considerable reduction in the time for final disposition of suits, viz, from 212 days in 1912 to 91 days at the end of 1914.

(10) The appointment of new employees for a probationary period of six months is a wise provision, as their efficiency can be noted during this time and their services terminated at the end of that period if they are found not qualified for the work to be performed.

Bureau of Medical Inspection.

(11) The bureau of medical inspection is well organized for the different kinds of work to be performed and more actual supervision is carried out in this bureau than in any other in the department.

(12) The assistant bureau chiefs have been wisely entrusted with the general management of their divisions and the direction of the work performed, with authority to decide all routine matters.

(13) The employment of full-time supervisors in checking the work performed by health officers and quarantine officers is one of the most important steps taken in increasing the efficiency of the contagious-disease division.

(14) The work of the division of child hygiene is to a large extent in a formative stage, but the organization is adequate for the amount of work it is now possible to do and steady progress is shown by a study of past and present results.

(15) The necessity for full-time supervisors in the division of child hygiene will arise when an increase in the work occurs through more active cooperation of the schools as a result of educational propaganda.

(16) Class A quarantine is effective in preventing spread of infection and meets all objections raised against hospitalization by the more financially able.

(17) Class B quarantine is more effective than would naturally be supposed and shows the results of education and instruction by the health and quarantine officers and meets the objection to hospitalization of the large middle class.

(18) Though the data on Class C quarantine shows that no doubt the number of contact cases has been reduced because of instruction given relative to keeping the patient in one room and the other susceptibles from immediate contact as much as possible, and the proper precautions to be carried out as regards the discharges and excretions from the patients, the results are not satisfactory.

(19) In the case of class C quarantine hospitalization is urged and required, but at present the hospital facilities are inadequate.

(20) When the new contagious disease hospital is ready for receiving patients all cases of scarlet fever and diphtheria that can not be isolated under class A and class B quarantine should be hospitalized.

(21) With the development of its A and B quarantine and the hospitalization of patients not falling in these classes, the department need not fear a comparison of its management of communicable diseases with that of any city.

(22) In the vast majority of cases of typhoid fever the disease was terminated and the patient discharged without proper bacteriological examination to determine whether or not the patient harbored the bacilli in the stools.

(23) Further study should be made to determine the feasibility of not releasing cases of typhoid fever that have been hospitalized until proper examination has been made to eliminate the possibility of carriers.

(24) Chicago is in the forefront in its provisions for the treatment and control of tuberculosis. The activities of the municipal tuberculosis sanitarium are fourfold: Dispensary department, home extension department, educational and sanitarium treatment of the disease. By the end of 1915 there will be 2,300 beds available for tuberculous patients.

(25) In new school buildings satisfactory waiting and consultation rooms are being provided for the use of the health officer in his work, but in the majority of old buildings there is no proper room available and the health officer has to use any space he can secure.

(26) The plan of exclusion of pupils from classrooms who have been exposed to whooping cough, mumps, chicken-pox, or German measles at school is a safe one, but the question arises as to whether or not it is necessary, especially in view of the following:

(a) That the exposure in most cases is slight.

(b) That both health officer and nurse could make daily examination of all susceptible contacts before they were allowed to go to their classrooms.

(c) That the occurrence of contact cases in Class C quarantine (6.17 per cent), if taken for comparative purposes, would seem to indicate that the occurrence of secondary cases would be rather the exception than the rule and that such could easily be detected by the health officer and any spread of infection prevented.

(d) That this exclusion causes dissatisfaction to the parents and in some instances to the teachers.

(27) The present plan of excluding from school pupils exposed to whooping cough, mumps, chicken-pox, and German measles should be altered to allow the children to continue at school providing that daily inspection of contacts be made by the health officer during the period when they would have been excluded from school.

(28) The important work of making physical examination of pupils is handicapped by the necessity of securing parents' consent and varies in the different schools in accordance with the active cooperation

of the principals, the intelligence of the parents, and the ability of the field nurse in convincing the children and their parents that there is no exposure of the person and that it is of vital importance to determine if there is any defect that impairs the child's health and progress in his studies.

(29) At present physical examinations are made on only about one-half of the school children. Steady progress is being made in this respect and each year shows an improvement, this being especially true in parochial schools, where in many the spirit of tolerance has been replaced by one of cooperation.

(30) Little difficulty is experienced in securing parents' consent for dental treatments in school children; this service has to be safeguarded against abuse.

(31) The number of dental dispensaries is insufficient, as even in caring for indigent cases there is sufficient work to keep more than double the present number fully occupied.

(32) The city of Chicago is distinctly backward in providing adequate funds for infant-welfare service, and most of the work accomplished is performed through the agency of the infant-welfare society and by funds contributed by public-spirited citizens.

(33) Placing all of the school health nurses in the field to do infant-welfare work during the hot months, when this work is most urgent, results in a large extension of this activity and is productive of much good.

(34) The need of supplying the health department with ample funds to enable it to carry on infant-welfare work satisfactorily, thereby taking the lead in this activity, and having the organization supported by private charity supplementary instead of the main reliance, should be recognized.

(35) The organization of this division is well planned and the work accomplished has reached a high standard of efficiency deserving of much commendation.

(36) The efficiency marking system in use in connection with the field divisions of this bureau as developed and administered is the best in the department and as good as any in the city.

(37) The files in this office are in excellent condition, well arranged and kept strictly up to date.

Bureau of Food Inspection.

(38) On account of the absence of specific ordinances until 1912 and lack of sufficient appropriation in 1913, actual systematic inspection of the dairy field was not begun until January, 1914, and this short period of activity should be taken into consideration when discussing present conditions.

(39) With an average of one dairy inspector for 933 farms it is apparent that this particular inspection service is inadequate and that not more than an average of two inspections of a farm in 12 months can be done.

(40) In order to make dairy inspection effective it must be sufficiently frequent to insure proper supervision, especially in those farms where improvement in sanitary conditions is required.

(41) An essential feature of the inspection of a dairy should be the instruction of the dairyman in advantageous changes in his stables, milk house, proper cleanliness in milking, cooling of milk, and improved methods in handling dairy products.

(42) The number of inspectors for dairy field work should be increased by 10 in order to insure inspections at sufficiently frequent intervals for proper supervision and to raise the farms to the required standard.

(43) The inspection of all dairies located in the State of Illinois should be turned over to the State service, as such should result in protecting all places in the State, whereas that by city inspectors protects only Chicago.

(44) Further instructions in field work should be given the dairy inspectors, so that there will be more uniformity of standard in scoring farms. Milk inspectors in the city should receive further practical instructions from the supervisor in the proper scoring of milk depots and milk stores in accordance with actual conditions present.

(45) The transportation of milk to the city during the summer months is faulty, as there is not proper refrigeration of the cars; in fact, in most instances none is attempted. The department is endeavoring to enforce the ordinance requiring refrigeration, and there are now 10 suits pending against the railroads for this particular violation.

(46) The inspection of milk at the receiving platforms is inadequate on account of the small number of inspectors that can be assigned to this work. The number should be increased.

(47) The large number of small milk depots selling milk in bulk constitutes the most unsatisfactory feature connected with Chicago's milk supply. The department realizes that a large per cent of these should be closed, but such procedure is difficult to enforce.

(48) All pasteurizers are required to be equipped with holding device, and a temperature of 140° F. for 20 minutes is required. Many of the 246 plants operating in the city are small and not satisfactorily operated from the standpoint of pure milk, and when those that can not comply with the highest requirements are closed the milk supply of the city will be materially improved.

(49) Owing to uncertainty of dairy conditions and the inability to inspect farms sufficiently often to maintain proper standards of cleanliness, all milk should be pasteurized.

(50) Considerable improvement in the milk supply has been effected in the last two years.

(51) A satisfactory inspection of cattle before slaughter and of carcasses is maintained; meat inspection in slaughterhouses and markets is carefully performed by trained inspectors.

(52) Inspection of other food products is ample to safeguard the public health, and that of establishments manufacturing and handling such products is sufficiently frequent to keep them up to the required sanitary standard.

Laboratory Bureau.

(53) Rearrangement should be made to utilize the space more satisfactorily. Alterations in some of the cabinets are necessary.

(54) The salaries paid to technical employees are too small for best efficiency and for retaining such employees in the service.

(55) The procedure of passing samples and specimens through the laboratory is satisfactory, and the system of reports and filing seems to be adequate.

(56) A suitable animal and storeroom should be provided and a crematory installed for reduction of garbage and waste from the laboratory.

(57) Ventilation in some portions of the laboratory should be improved.

(58) The establishment of a research division does not seem advisable.

Bureau of Hospitals, Baths, and Lodging Houses.

(59) The hospitals operated by the bureau were found satisfactorily administered.

(60) The contagious-disease hospital is under the direction of a very capable medical superintendent, is kept scrupulously clean, and the details of administration are correct in principle and application.

(61) The isolation hospital is so arranged that facilities exist for care and treatment of patients of different ages and sexes in separate wards and rooms. It is light, airy, and sufficiently equipped so that patients need have no dread of going to the institution.

(62) The Iroquois Memorial Hospital meets the demands of a first-aid station, the purpose sought by its administration. However, additional funds are needed for the operation and maintenance of this institution.

(63) As the department already conducts an ambulance service for handling contagious diseases, the other city ambulance service, now under the control of the police department, should be transferred to the health department in order to facilitate efficiency and economy of administration.

(64) The public baths maintained by the city and under the administrative direction of the bureau furnish hygienic facilities to a large number of people living in the poorer and tenement sections where baths have not been installed in the houses.

(65) The value of such establishments has been realized and appropriations have been requested for additional bathhouses and for thorough repair of the existing ones.

(66) The operation of the baths is carried out with a limited personnel, but the bathhouses are clean and well conducted. Additional funds should be provided for equipment, general maintenance, and an increase in the number of attendants.

(67) The waiting rooms in the present baths are too small and in new bathhouses such adequate provisions should be provided.

(68) Funds should be appropriated for the construction of a large and moderately equipped lodging house and the necessity of providing such facilities can not be too forcibly emphasized.

(69) The lodging houses are clean and satisfactorily administered and the value of the service to the unfortunates is great. Even though a large number of lodgers are required to sleep on the floor, such accommodations are far better from the lodgers' standpoint than the street.

(70) It seems advisable that the inspection service of lodging houses in Chicago now conducted by State officials should be turned over to the health department and the functions of the bureau enlarged by providing the necessary number of inspectors to execute this work.

(71) The number of employees allowed for the inspection service of hospitals, dispensaries, and nurseries is too small for as careful supervision of these activities as seems desirable. This work should be enlarged as soon as larger appropriations make it possible.

Bureau of Sanitary Inspection.

(72) On account of its varied activities the bureau of sanitary inspection is the most difficult one in the department to administer satisfactorily.

(73) One of the most important functions is the control exercised over the construction of new buildings, especially tenement houses, alteration and repairs, and plumbing installations.

(74) The ordinance governing construction of tenement houses is excellent and the enforcement of its provisions is gradually improving housing conditions in Chicago. However, there is need for specific authority for tenement inspections and an additional number of employees to perform this work.

(75) The plumbing ordinance needs revision and amendment so as to require the owner or agent to secure a permit for changing the plumbing in houses already constructed.

(76) In the interest of economy and procedure the supervision of the laying of house drains should be transferred to the health department and placed under the jurisdiction of its plumbing division.

(77) Chicago has made commendable progress in requiring ventilation of theaters, other public buildings, and street cars, and the division of ventilation deserves credit for the results accomplished with a limited personnel during the two years of its activity.

(78) The bureau has accomplished good results in its campaign for the elimination of cellar bakeries, having reduced the number from 581 in 1907 to 187 in 1914, and a general improvement in both location and sanitary condition has been effected. However, on account of the validity of the bakery ordinance being questioned and the inability to enforce the necessary requirements, there still remains a considerable number in which the sanitary conditions should be improved.

(79) The workshops in Chicago are in the main in good sanitary condition and there are not many instances of badly overcrowding. Sweat shops in the common acceptance of the term do not exist. As a whole the shops are better than those in most large cities.

(80) In considering the condition of stables, the fact that only a year has elapsed since specific authority over them was granted the health department must be taken into account.

(81) On the whole the stables are in poor condition from a sanitary standpoint, drainage is absent or inadequate, floors are not of impervious material, manure boxes are in bad condition and not fly proof.

(82) The activities under the miscellaneous division were in the main satisfactory, although some of the establishments inspected were in bad condition.

(83) There has been a great increase in the number of complaints handled, and the time required for abatement of the nuisance shows a marked improvement over that secured in previous years. The method of handling complaints is satisfactory.

(84) The administration of this bureau is faulty, as the bureau chief, who is of unquestioned ability, devotes too much of his time to details that should be left to his assistants; supervisors spend practically all their time in the office and exercise insufficient supervision over the actual field work of their inspectors; inspectors also spend too much time in the office.

Bureau of "Vital Statistics."

(85) There is urgent need of a more satisfactory law governing the registration of births and deaths.

(86) The bill governing the registration of births and deaths now pending before the State legislature should be enacted into law in order to provide adequate authority and necessary procedure.

(87) The bureau should resume the registration of births as soon as practicable.

(88) The recent reorganization of the office force has resulted in marked increase of efficiency in routing work through the office.

Garbage Disposal.

(89) In studying the efficiency of operation of the reduction plant the fact that the plant is undergoing repairs and reconstruction must be taken into consideration.

(90) Funds for the reconstruction of the grease-extraction plant should be made available as soon as possible, so that the city can take advantage of the extraction and sale of by-products, thereby greatly increasing the revenue derived from garbage reduction.

(91) Since the plant has been operating under the control of the health department radical changes in general conditions around the plant have been effected. The most marked is the excellent sanitary condition maintained.

(92) The plant is being efficiently operated for the purpose of reducing garbage in an inoffensive manner through scrupulous cleanliness and proper care of garbage, so that offensive odors do not occur to any extent and there is no complaint from persons living in adjacent districts.

PLAGUE-PREVENTION WORK.

LOUISIANA—NEW ORLEANS—PLAGUE ERADICATION.

The following reports of plague-eradication work at New Orleans were received from Surgeon Creel, of the United States Public Health Service, in temporary charge of the work:

Week Ended September 4, 1915.

OUTGOING QUARANTINE.		BUILDINGS RAT PROOFED.	
Number of vessels fumigated with sulphur..	13	By elevation.....	94
Number of vessels fumigated with carbon monoxide.....	20	By marginal concrete wall.....	114
Number of vessels fumigated with hydrocyanic gas.....	3	By concrete floor and wall.....	142
Pounds of sulphur used.....	1,831	By minor repairs.....	107
Coke consumed in carbon monoxide fumigation, pounds.....	26,200	Total buildings rat proofed.....	547
Pounds of potassium cyanide used in hydrocyanic gas fumigation.....	262	Square yards of concrete laid.....	14,156
Pounds of sodium carbonate used in hydrocyanic gas fumigation.....	360	Number of lots and sheds, planking removed.....	30
Pounds of sulphuric acid used in hydrocyanic gas fumigation.....	264	Number of buildings demolished.....	45
Clean bills of health issued.....	30	Total buildings rat proofed to date (abated).....	90,597
Foul bills of health issued.....	5		
FIELD OPERATIONS.		LABORATORY OPERATIONS.	
Number of rats trapped.....	6,441	Rodents received by species:	
Number of premises inspected.....	10,714	Mus rattus.....	138
Notices served.....	2,259	Mus norvegicus.....	1,269
Number of garbage cans installed.....	152	Mus alexandrinus.....	132
		Mus musculus.....	4,791
		Wood rats.....	55
		Muskrats.....	38
		Putrid (included in enumeration of species).....	106
		Total rodents received at laboratory.....	6,423
		Rodents examined.....	1,733
		Number of suspicious rats.....	4
		Plague rats confirmed.....	1